Hudd part 2 of a catalogue of the Lepidoptera of the Bristol district.

"SCIENCE Teaching in Living Nature, a Popular Introduction to the Study of Physiological Chemistry and Sanitary Science," is the title of a little volume by Mr. W. H. Watson, F.C.S., just published by Stanford.

THE additions to the Zoological Society's Gardens during the past week include two Diana Monkeys (*Cercopithecus diana*) from West Africa, presented by Mr. F. J. Crocker; a Green Monkey (*Cercopithecus callitrichus*) from West Africa, presented by Mr. C. F. S. Day; a Malbrouch Monkey (*Cercopithecus cynosurus*) from West Africa, presented by Miss Agnes Barker; a Black Stork (*Ciconia nigra*) from Jutland, presented by Prof. J. Reinhardt, F.M.Z.S.; a Rose-crested Cockatoo (*Cacatua moluccensis*) from Moluccas, presented by Miss Foster; fourteen Golden Tench (*Tinca vulgaris*, var.), presented by Lord Walsingham, F.Z.S.; a Common Buzzard (*Buteo vulgaris*), European, deposited; two Black-footed Penguins (*Spheniscus demersus*) from South Africa, purchased; two Crested Pigeons (*Ocyphaps lophotes*), two Geoffroy's Doves (*Peristera geoffroii*), bred in the Gardens.

OUR ASTRONOMICAL COLUMN

THE ELONGATED NEBULÆ.—The amateur provided with an equatorial of fair aperture and a parallel-wire micrometer might do good service by the accurate determination of the angles of position of the elongated or greatly-extended nebulæ, of which so far the number of reliable measures is but small, though such objects are pretty commonly distributed. The necessity for further observations in this direction is well illustrated by the note to No. 2501 of Sir John Herschel's General Catalogue = H. I. 94; H. made the nebula by one observation extended n. to s., by another nf. to sp., while two observations by Sir John Herschel agree in making it extended in the parallel; "Surely," he remarks, "it does not rotate?" D'Arrest ("Siderum Nebulosorum") merely says: "Circa directionem axis nihil annotatum fuit."

In 1874 Mr. Cleveland Abbe called attention to this subject, and in the *American Journal of Science and Arts*, January, 1875, has collected the approximate places of about sixty elongated nebulæ from Herschel's catalogue, and has appended formulæ by which the right ascension and declination of the poles of a very much extended nebula may be calculated. These formulæ he has applied to such measures or estimations, often rough ones, of the angles of position as were then published.

THE NEW BINARY STAR τ CYGNI.—This star, the duplicity of which was detected by Mr. A. G. Clark in October, 1874, with the 26-inch object-glass manufactured for Mr. McCormick,[1] of Chicago, well deserves following up; in the 3½ years to 1878·4, when measures were made by Mr. Burnham, the angle of position had retrograded 25°, with but little change of distance, though a slight decrease may be suspected. The components are about 4·5 and 8. Right ascension for 1880, 21h. 10m. 8s.; declination, 37° 32′. If the motion in angle has been equable since 1874, the position may now be about 140°.

LETTERS TO THE EDITOR

[*The Editor does not hold himself responsible for opinions expressed by his correspondents. Neither can he undertake to return, or to correspond with the writers of, rejected manuscripts. No notice is taken of anonymous communications.*

[*The Editor urgently requests correspondents to keep their letters as short as possible. The pressure on his space is so great that it is impossible otherwise to ensure the appearance even of communications containing interesting and novel facts.*]

"Report of an Unusual Phenomenon Observed at Sea"

As the unusual phenomena observed in the Persian Gulf, described in NATURE, vol. xx. p. 291, has hitherto called forth no remarks, I venture to put forward a suggestion that may be of service in elucidating the matter.

First, I would observe that the so-called parallel waves were probably arcs of large concentric circles, whose common centre lay south-south-west of H.M.S. *Vulture's* first, and east of her last, position. The distance between these positions was about a knot and a half, therefore the vessel was never nearer this centre than about half a mile, and a short arc of a circle of this radius might well be deemed straight.

The accompanying diagram, drawn from the data, shows the position of the centre of disturbance, and of the luminous waves, with relation to the course of the ship, taking the above view, which I think is borne out by the character of the second series of luminous waves through which H.M.S. *Vulture* passed.

Most living creatures possessing phosphorescence have more or less control over its display. In the case of the fire-fly, the light that one emits calls forth almost instantaneously answering flashes from others. No dweller in the tropics can have failed to observe the manner in which trees are lit up by the simultaneous flash of thousands of fire-flies, and the period of darkness that intervenes before the next flash. If then we consider the *Vulture* to have passed through a shoal (if I may so term it) of animalculæ, possessing the power of exhibiting phosphorescence intermittently, and exciting each other to do so, the impulse travelling from one to another at the rate of 125 feet a second, and the display of light to the dark interval bearing the ratio 1 to 3 (in time, $\frac{1}{5}$ of a second to $\frac{3}{5}$), we have accounted for the phenomena so far as the luminous waves are concerned.

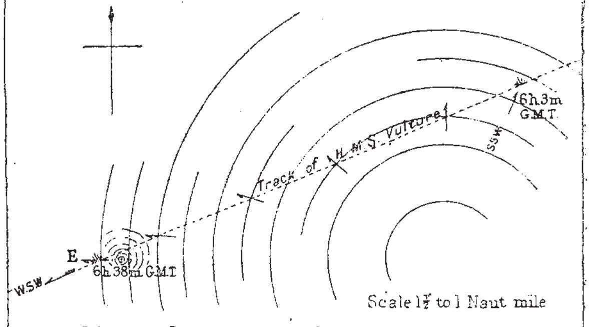

Diagram showing position of luminous wave centres

What were the central disturbances that originated the action, it is impossible to say, though it is easy to imagine several causes of irritation, that would not have been detected by the simple observations taken on board the vessel.

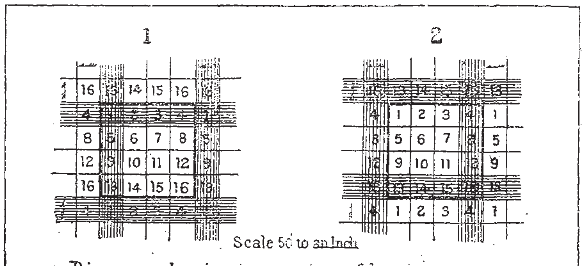

Diagram showing intersections of luminous waves.

The luminous waves of the smaller series "meeting the parallel waves from south-east did not cross, but appeared to obliterate each other at the moving point of contact." The above is difficult to explain, if the luminosity of the waves was obliterated at the actual intersections. It can however be readily shown that close to the intersections are spaces where the phosphorescence of the animalculæ would have to be displayed for twice as long a period as in other positions, and we have but to admit a want of energy to meet this call, and dark spaces will appear in each system of waves, immediately following the passage of the crossing wave.

This would certainly give the appearance of one wave obliterating the other.

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A second diagram explains this simply. Here a portion of ocean is divided into numbered squares of 25 feet, and the advance of the 25' luminous waves, 75' apart is shown in two following positions. It will be seen that spaces numbered 4 and 13 fall successively under the impulses. Similarly, in the next 25' advance of the waves, would all those numbered 12 and 15, and so on, the assumed dark spaces following in the wake of each intersection, as it pursues its diagonal course.

Beckenham, August 5 EDWARD H. PRINGLE

The Planet Jupiter

IN the bright zone south of the south equatorial belt may now be seen a strange and beautiful feature like a flame—red elliptical cloud surrounded by a brilliant white aureole. I first observed it near midnight on the 14th inst., when approaching the middle of its apparent course across the disk.

In November, 1869, Mr. Gledhill discovered an elliptical figure in the same zone, but it was dark, with an interior space bright and colourless.

Gledhill's No. 2 belt (*Ast. Register*, April, 1870), which was a most striking feature for some years, disappeared in 1874, reappeared in May, 1875, again disappeared, and is now again faintly visible. It is *under* (north of) the north equatorial belt.

The south equatorial belt seems of a slate-blue, the north of a russet or dark red colour. The bright central space is crossed by dark, irregular bridges slanting from south-west to north-east—the invariable direction of all the oblique formations that I have ever remarked on Jupiter.

The north polar region seems occupied by a number of apparently close, narrow belts. The south has a pretty similar appearance, but the belts here are not so numerous nor so distinct. JOHN BIRMINGHAM

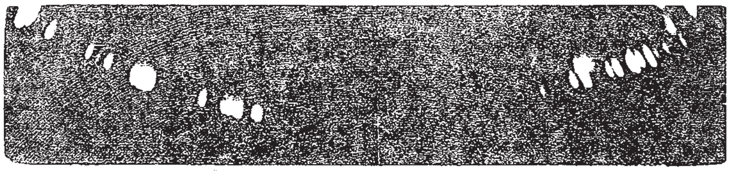
August 15

Twenty-nine Gleams of Sunshine, August 7, 8, 9, in Nine Hours

IN a paper, about weather, written by Mr. Ellis, of Greenwich Observatory, and published in NATURE, vol. xx. p. 313, mention is made of work done with an instrument for registering sunshine, which I contrived, got made, and gave to the Observatory. It consists of a glass sphere, a stand for it, and a metal bowl. The spherical surfaces have a common centre, and radii so measured that the focal cone of sunshine condensed by the glass is cut, by blackened cardboard fixed in the bowl, at the same distance, and at right angles, whatever the sun's position may be in the visible sky. The temperature near the point is at least 700° when the weather is clear. The sun's circular image describes a circle about the common centre, and it burns a trace on cardboard when the sun shines clearly. I can think of nothing better or simpler for the purpose of registering sunshine and counting clouds daily.

The inclosed printer's block was engraved in the focal cone of a cast glass sphere. The flat surface, blackened with shoe-blacking, was set roughly parallel to the plane of the equator, and the hot point was brought to bear upon it, at about 1 P.M. on August 7. Thus arranged the section of the cone is not circular, but is an ellipse, which is longer or shorter in proportion to the clearness of the atmosphere. The ellipse describes a circle on the boxwood plane. Hollows burned out by it print white, the surface left prints black. Clouds which crossed the sun's path may be counted between white oval spots. There are twenty-nine spots, the rest was cloud. In common weather parlance the morning of the 7th was "sunny," but the blue sky was veiled by a broken roof of thin detached clouds, moving eastward. They hindered heat waves. Between them were narrow clearer openings. When one of these passed the sun the cone of sunshine burned the block instantly. Afternoon about two, the broken cloud roof mended, rain fell, and the evening was dark and sunless. The night was wet. The morning of the 8th was "cloudy." Not a patch of blue sky was visible big enough to make a pair of breeches for a Dutchman. But the weather "looked as if it might clear up." The sun was "trying to shine." Birds sung notes which forecast a fine day, and the day was "fine." The official forecast was "cloudy" and the day was very cloudy. The sun was seen "wading through mist" at intervals. At 10 A.M. one brighter gleam burned a mark; but that was all the bright sunshine that reached this garden. For a great depth the air was full of water condensed into the shape of the burning glass. Each spherical drop acted on sunshine as the bulb of a spirit thermometer acts—in "absorbing heat," in stopping, refracting, and dispersing waves of solar radiation. There was more shade than sunshine at the ground. The morning of the 9th was sunny, hazy, and cloudy. But large patches of very pale blue sky were visible. Birds foretold a fine day, and they were true prophets. The sun's image came on the block at 9.30 A.M., and it was set carefully at 10, and left till 2 P.M. The air was "thick" all day, the blue of the sky was very pale, and the sunshine "watery." The record shows when brighter gleams occurred during the time of exposure. About noon, as commonly happens, clouds gathered and hid the sun. The brightest time came after noon.

2 P.M. 10 A.M.



This bit of "thermographic wood engraving" may give readers in brighter climes some notion of the dismal cloudy sky of this abnormal English summer. There has not been a cloudless day since the year began. The blue of the sky never has been the dark indigo of Egyptian and Californian skies.

The cause of this excess of cloud I take to be excess of solar radiation, and consequent evaporation to our westward. Condensation has been in proportion along the European Atlantic coasts, where the ground was chilled by a late and severe winter, and has been little warmed and dried since by sunshine. According to casual and official weather reports, public and private, the heat has been great in America, on the Atlantic, in Spain, in the south of France, in Eastern Russia, in Egypt, and on the Red Sea. The sun shines fiercely upon the ground beyond the edge of a great cloud which has come persistently from the Western Ocean to overshadow our islands, and to drench and batter them with rain and hailstones. Our shadow is the result of sunshine. Our grass is green, our health is good, our gardens are gay in spite of the clouds, or because of them.

Believing in this theory I am going eastward in search of brighter weather, and I send this record of watery sunshine for your acceptance before I start. J. F. CAMPBELL

Niddry Lodge, Kensington, August 9

Electric Clocks

THE various contrivances for electric clocks all depend on producing contacts with the pendulum, which is confessedly undesirable; and they nearly all produce these contacts when the pendulum is at rest at the highest point, which is the worst position.

There seems no reason why a pendulum with a coil-bob traversing over a short permanent magnet, as is usual, should not be independent of contacts. While descending the lower part of the stroke it reaches the magnet, and a current is thus excited in the coil, which is conveyed out at the knife-edges and works a switch; this sends a battery current through the coil for a short period while the pendulum is beginning its ascent, and so drives it forwards by repulsion from the magnet. The same process is repeated in the back stroke. The interval between the production of the excited current and the battery current, and also the duration of the battery current, may be regulated by a small pendulum whose single swing is equal to the interval, and which is liberated by the excited current. The details are so easily

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